Total Maximum Daily Load (TMDL) Development to Address Water Quality Impairments in an Unnamed Tributary to the Chickahominy River

Technical Advisory Committee Meeting

April 4, 2003

Virginia Department of Environmental Quality

DEQ Introduction

- **Piedmont Regional Office (Discussion of TMDLs and the UT to Chickahominy River)**
- **TetraTech/GMU (Technical approach for TMDL Development)**
- **Questions**

The what, why, and how behind Total Maximum Daily Loads (TMDLs)

Overview

- What is a TMDL?
- Why are TMDLs needed?
- How are TMDLs developed?
- What kinds of TMDLs are currently being developed?
- What is the impaired segment?
- How can stakeholders (you) be involved?

What is a TMDL?

TMDL = TOTAL MAXIMUM DAILY LOAD

- **Amount of pollution a water body can receive without negatively affecting its beneficial uses.**
  - - aquatic life, fishing, shellfishing, swimming, drinking water
  - **The TMDL budget includes all forms of pollution**
    - point sources
    - non-point sources
    - natural background sources

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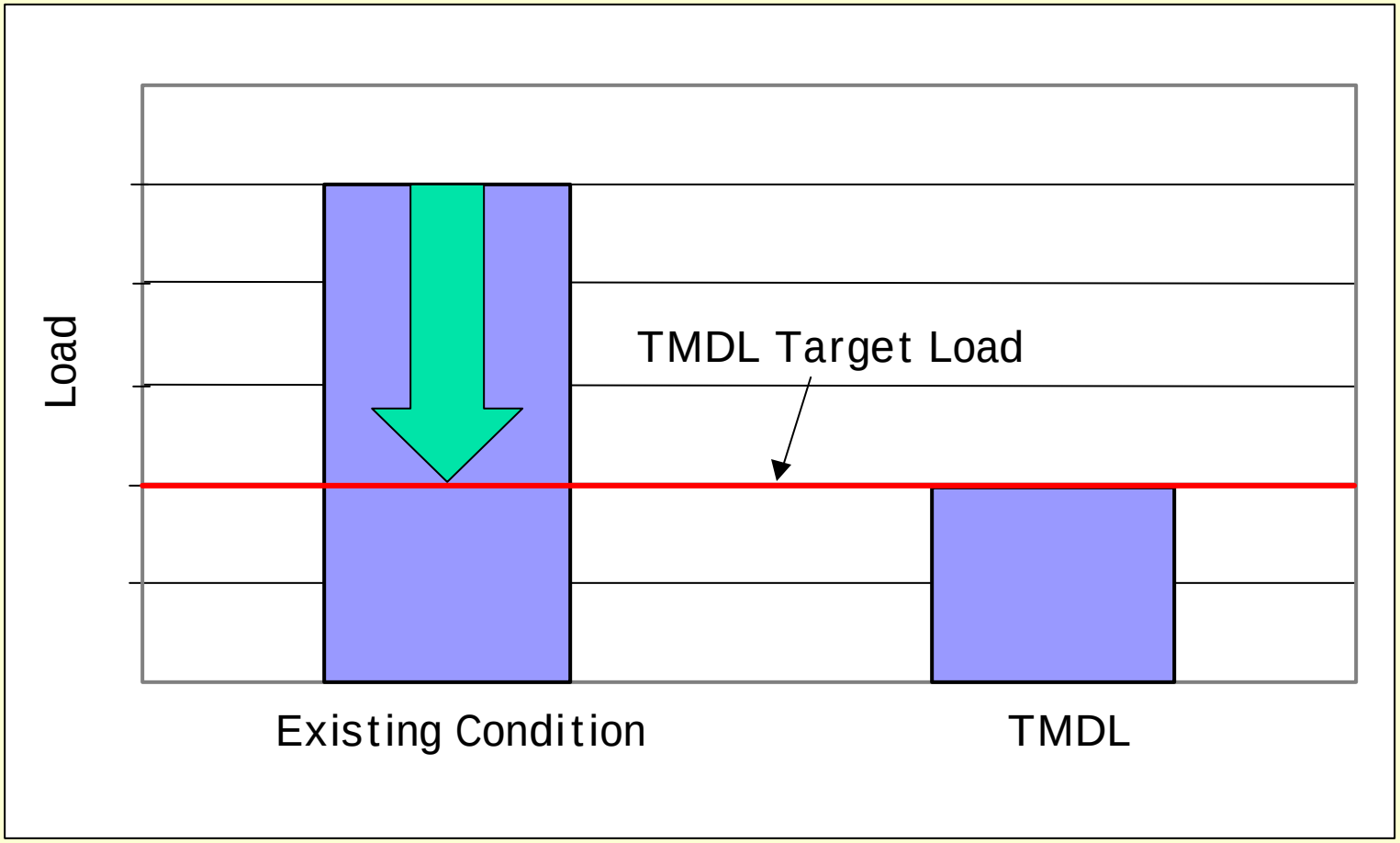
Example TMDL



Reducing load in the impaired watershed to the target TMDL load is expected to restore water quality

Overview

- What is a TMDL?
- **Why are TMDLs needed?**

Why are TMDLs needed?

"The primary mission of the TMDL program is to protect public health and the health of impaired aquatic ecosystems by ensuring attainment of water quality standards, including beneficial uses." (US EPA, 1998)

Legal basis for TMDL program

- **1972 Clean Water Act (CWA) &/or 1997 Water Quality Monitoring, Information and Restoration Act (WQMIRA)**
  - **Water quality monitoring**
  - **Periodic assessments**
  - **Listing of impaired waters**
  - **TMDL development for impaired waters**
  - **Implementation plans**

Overview

- What is a TMDL?
- Why are TMDLs needed?
- **How are TMDLs developed?**

Required Elements of a TMDL

- Be developed to meet water quality standards;
- Be developed for critical stream conditions;
- Consider seasonal variations;
- Include wasteload and load allocations;
- Include a margin of safety (explicit or implicit);
- Consider impacts of background contributions;
- Be subjected to public participation; and
- Have reasonable assurance for implementation.

The TMDL development process

- **Characterize the watershed**
  - Gather and synthesize data
  - Involve stakeholders (you) in verifying existing data and collecting additional data
  - Use computer models to develop TMDL
- **Conduct initial public meeting (30 day comment period)**
- **Develop draft TMDL**
- **Conduct final public meeting and release draft TMDL (30 day comment period)**
- **Route TMDL through the Approval Process**

Steps After TMDL Development

- **EPA approval no later than June 1, 2004**
- **TMDL adopted by State Water Control Board**
- **Implementation Plan Development: currently developing guidance with DCR**
- **Implementation (voluntary for non-permitted activities) and follow-up monitoring**
- **Ongoing opportunities for public input and participation**

TMDL Implementation

- **Implementation plans not required under CWA or by EPA's current regulations.**
- **DEQ is required by state legislation to develop implementation plan**
- **DCR has lead role in NPS implementation plans**
- **DEQ and DCR are developing framework for NPS TMDL implementation plans**

Staged Implementation

- **TMDLs include staged reduction targets**
  - **allows most cost-effective measures to be implemented first**
  - **allows iterative evaluation of TMDL adequacy in achieving water quality standard**
  - **last stage may require review/change of WQS**

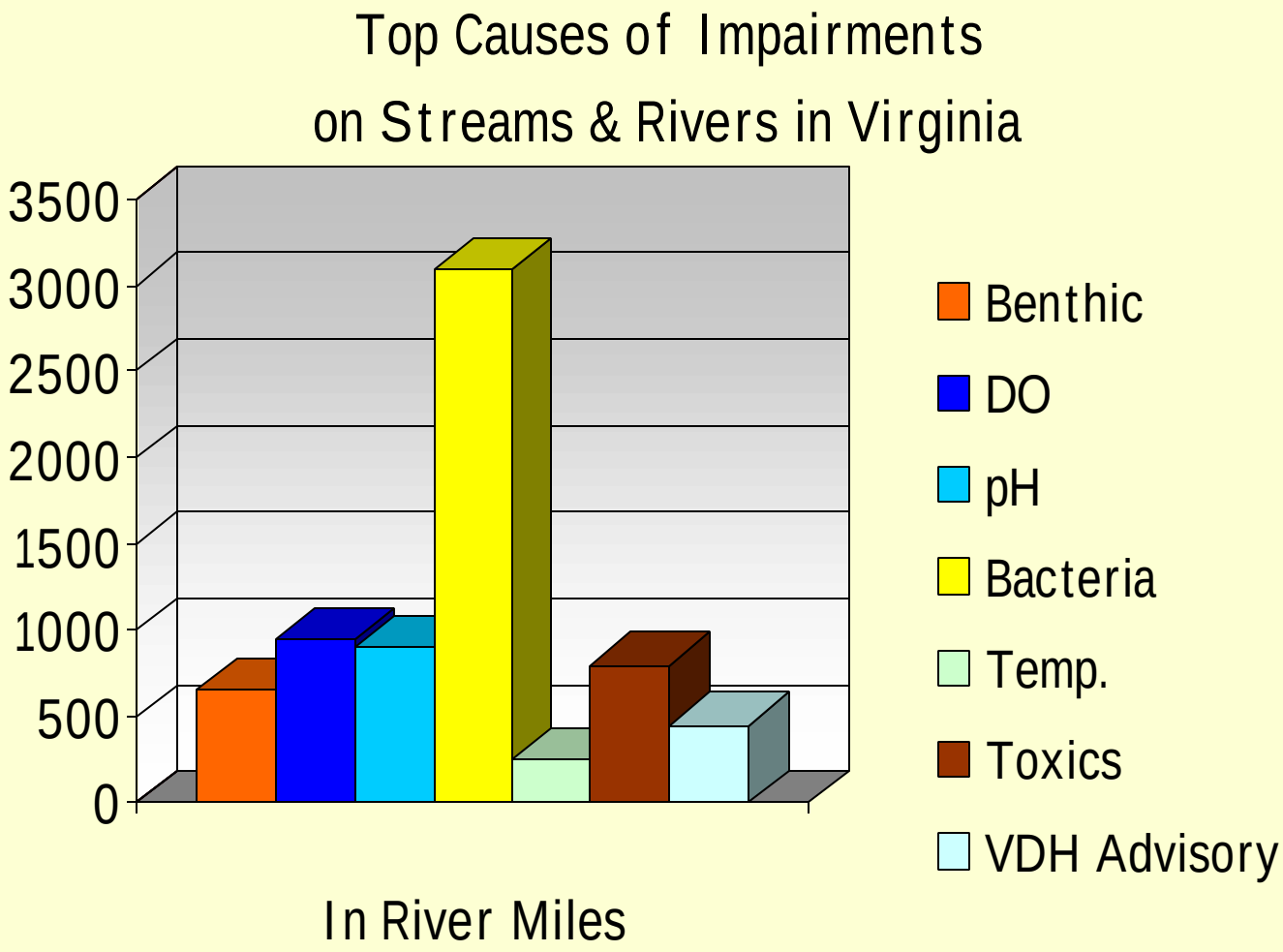
Overview

- What is a TMDL?
- Why are TMDLs needed?
- How are TMDLs developed?
- **What kinds of TMDLs are currently being developed?**

Water Quality Standards

- **TMDL developed for streams that don't meet water quality standards**
- **Purpose of Standards is the protection of 5 beneficial uses:**
  - Aquatic life
  - Fish consumption
  - Public water supply
  - Shellfishing
  - Swimming

Top Sources of Water Quality Impairment



Water Quality Standard: Benthic Impairment

- **The aquatic life use is not met due to violations of the General Standard:**
  - "All state waters shall be free from substances […] which are harmful to human, animal, plant or aquatic life." (9 VAC 25-260-20)
- **Support of the aquatic life use is determined, in part, based on the biological assessment of the benthic community (= visible critters that live on the stream bed)**

What are benthic macroinvertebrates?

- **Stream-Inhabiting Organisms**
  - **Benthic: Bottom dwelling**
  - **Macro: Large enough to see**
  - **Invertebrates: Without backbones**
- **Indicators of Stream Health**
  - **Integrate the impacts of multiple short term environmental variations**
  - **Easy to sample, abundant in most streams**

Benthic Macroinvertebrates

Include larval or nymph forms of:

- **Insects**
- **Crustaceans**
- **Snails**
- **Mussels**
- **Clams**
- **Worms**
- **Leeches**

Dragonfly Larvae

Crayfish

Aquatic Snail

Benthic Impairments and TMDLs

- **After a benthic impairment is identified, more in-depth investigation must be done to identify:**
  - the cause of the impairment, also called the stressor, and
  - the reductions necessary to restore the benthic community, also called the TMDL endpoint
- **The TMDL endpoint is determined by comparing the impaired watershed to a reference watershed**

Overview

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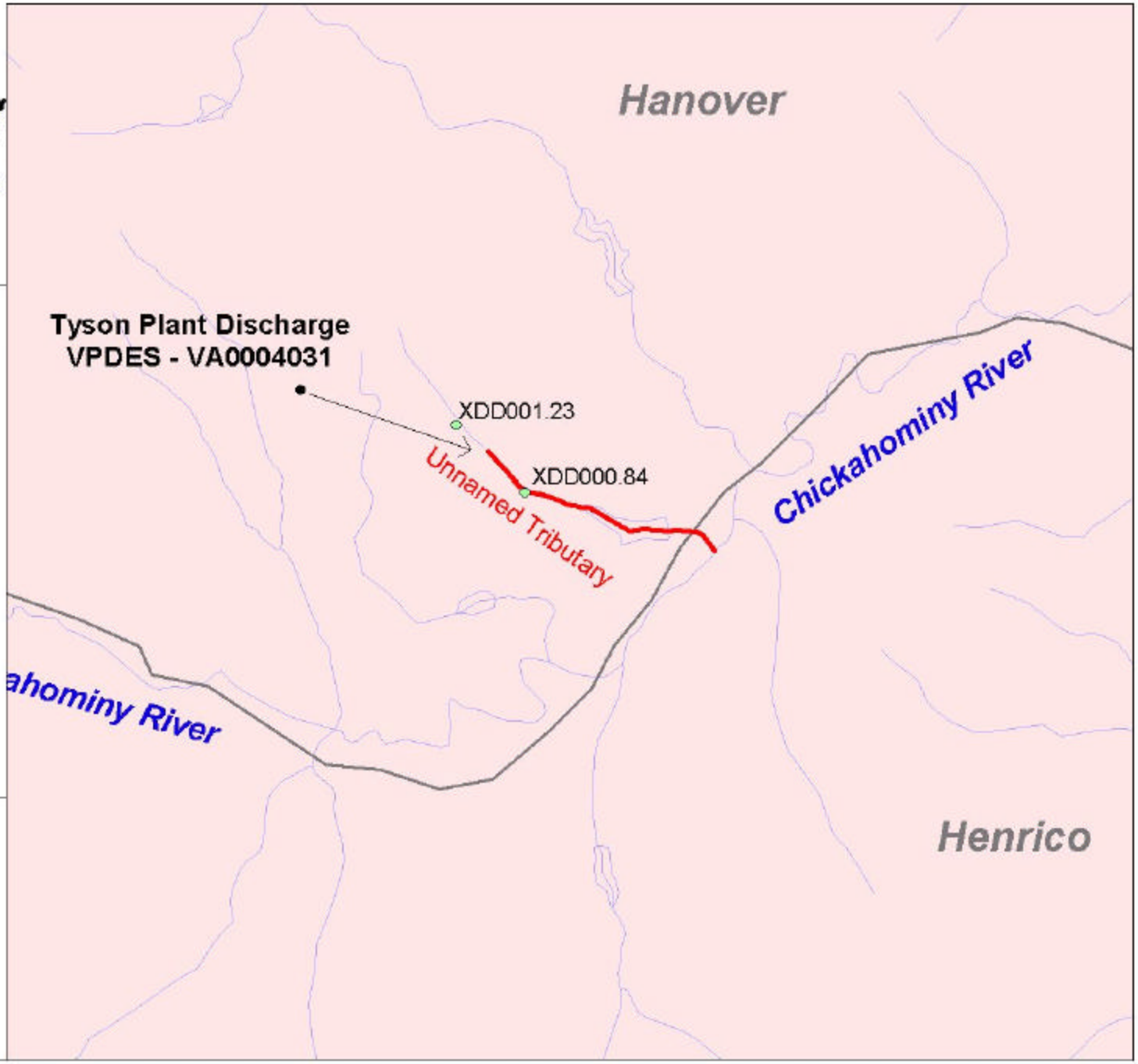
- Why are TMDLs needed?
- How are TMDLs developed?
- What kinds of TMDLs are currently being developed?
- **What is the impaired segment?**

Chickahominy River, Unnamed Tributary

2004 Commitment

George Mason University

TETRA TECH, INC.



0 0.5 Miles

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Legend:

- Monitoring Stations
- 2002 303(d) Impaired Segments
- Counties/Cities
- Rivers & Streams (NHD)
- James River Basin

Impaired Segment - Benthic

- **Initial listing for benthic community - 1994**
  - **From Tyson discharge (VPDES Permit No. VA0004031) to confluence with Chickahominy River**
  - **Initial listing station 2-XDD000.84**
  - **Benthic community immediately upstream of the discharge not impaired 2-XDD001.23**
- **Continued monitoring resulted in a similar assessment for the 1996 and 1998 reports.**

Monitoring Activity

- **Benthic community**
  - Listing station & control upstream
  - 2nd station at 2-XDD000.32 & control on Grassy Swamp Ck at RMI 0.96 (Rt 660, Hanover Co)
- **Water Quality Monitoring at listing station 2-XDD000.84**
  - Field Parameters (D.O., Temp., pH, Conductivity)
  - Nutrients and solids (July 2002-June 2003)
  - Diurnal DO monitoring and Toxicity study
  - Flow measurements

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- **How can stakeholders (you) be involved?**

What can you do as a stakeholder?

- **Get involved!**
  - **Participate in the TMDL process**
  - **Ask questions and make suggestions**
  - **Offer to provide and review local data**
  - **Volunteer for a local watershed advisory committee(s)**
  - **Support efforts to improve water quality in your watershed**

Next Presentation

Technical approach for TMDL Development (TetraTech-GMU)

this is where you can help...

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Virginia Department of Environmental Quality


Questions?
Info on impaired segments:
www.deq.state.va.us/water/303d.html